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Spring 2-1-2018

### GPHY 486.01: Transport, Planning & GIS

Christiane vonReichart  
*University of Montana, Missoula*

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# The University of Montana, Department of Geography, Spring 2018

## GPHY 486 Transport, Planning and GIS – 3 credit (CRN 38447)

with co-requisite laboratory GPHY 489-02 1-credit (CRN 38546)

Christiane von Reichert

<b>Place:</b>	Stone Hall 217 and GReaTLab Stone Hall 218		<b>Office:</b>	Stone Hall 210
<b>Time:</b>	MoFr 9-10.30 (class) We 9-10.50 (lab)		<b>Office Hours:</b>	Mo 10.30-11.30 am, 1-2 pm We 11-11.30 am, 1-2 pm Fr 10.30-11.30 am, and by arrangement
<b>e-mail:</b>	<a href="mailto:Chris.vonReichert@mso.umt.edu">Chris.vonReichert@mso.umt.edu</a> or <a href="mailto:c.vonreichert@umontana.edu">c.vonreichert@umontana.edu</a>		<b>Voice mail:</b>	406-243-4784
<b>TA:</b>	Ryan Rock		<b>TA Office:</b>	Stone Hall 206
<b>TA e-mail:</b>	Ryan.Rock@umconnect.umt.edu		<b>TA Hours:</b>	Mo 11am-1pm We 11am-1pm

### Co-requisite: GPHY 489:02 Cartography/GIS laboratory 1 cr,

- W 9-10.50 am (Geospatial Research and Teaching) Lab, Stone Hall 218.
- The lab will provide you with hands-on experiences and opportunities to start on assignments.
- However, you should be prepared to spend additional time outside of lab periods to complete lab assignments, and to additionally explore transport-related problems or GIS-T features on your own.
- Please note that some class periods will be used for lab activities – to make for a better ‘flow’ of the content.

### Pre-requisites and target audience:

This course is designed for upper-division and graduate students.

- You should have an adequate quantitative background (M 115/Math 117 or higher) or you should be inclined to acquire it outside this course.
- Basic knowledge of Windows operations is assumed.
- GPHY 284 Introduction to GIS and Cartography is helpful, but not required.
- I am asking students with strong quantitative and cartography/GIS backgrounds to cooperate with others to promote success for all in this course.

### Readings (overview):

- There is no textbook to purchase for this class.

- I selected the readings for this course from a variety of sources: chapters from text books, TransCad software manuals, and government reports including web publications.
- TransCad Manuals are built into the software.
- I also put a copy of earlier TransCad Manuals in the GRT Lab. Feel free to use it while working on your assignments in the labs. Please do not remove it from the lab.
- TransCad manuals consist of the User's Guide (TCUG), Travel Demand Modeling (TCTDM) manual, and the Routing and Logistics (TCRL) manual.
- Moodle and the server Robinson2016 will be used to provide access to class materials and data. (Moodle – class related, Robinson2016 – lab related.)

### Learning outcomes:

Students in this course will

1. Gain an understanding of networks (links and nodes) and their use GIS-T (here: TransCad)
2. will become aware of TransCad capabilities for **routing and logistics**, including access to services, and locating service facilities. We will put these tools to use to provide helpful analysis for the Montana Food Bank Network MFBN
3. advance their insight into the **patterns and trends in urban passenger transportation**,
4. develop an understanding of the **principles of transport planning and travel demand modeling in GIS-T**,
5. gain the ability to **employ TransCad**, the leading GIS-T software, to **solve transportation and network problems, and run travel demand models**,
6. and get to know street, socio-demographic and model-derived **data for Missoula, which will be used (and added to) throughout the course.**

Students will additionally

7. improve their skills in **organizing files and managing databases**,
8. and further their experience in **synthesizing** the findings of their model and **presenting** the findings **visually, in speech and in writing.**

### Assessment:

Progress in this course will be promoted in a variety of ways, and assessed and graded as follows:

- Attendance and participation in class and lab (approximately 10 points).
- Completion of a series of assignments (approximately 60 points)
  - Early, basic lab assignments will introduce you to essential TransCad functions. Several assignments will introduce you to the routing and logistics features of TransCad, useful for determining service areas. (application: Montana Food Bank Network data)
  - Most assignments of the course form a sequence for building the 4-step travel demand model using Missoula data.
  - Please note that these assignments 'build on each other': to move forward, you must have completed the previous assignment. In essence, the assignments are cumulative. Additionally, they can form a considerable part ('standard model') of your final project.
  - I strongly encourage you to keep up with the work and avoid falling behind. To show your progress, you will submit selected output and/or short write-ups.
- The final project will consist of a
  - digital and oral presentation, and a concise (1800-2500 word) paper (please also note due drafts).
  - The intent of the final project is to employ the widely-used four-step transport model for Missoula and modify it above and beyond the lab assignments.
    - Examples of modifications: changes to the underlying transport network or to the land use system, changes in methods and parameter, or other modifications, such as pollution effects, bike routes, etc.

- 1-2 exams, or several short quizzes may be given, focusing on the conceptual understanding of course content (10 points)
- ✓ Throughout the course, you can work solo or in a team of 2 students.
- ✓ For teams: Lab assignments must show both names, but be submitted separately, even if identical in content (to better keep track of submitted work).
- ✓ Network and final project presentations may be made as a team, but the papers need to be separate papers.

### Graduate Increment/s:

#### Graduate students

- will additionally write a 2500-4000 word paper which must contain: a properly formatted cover page, a table of content (Tip: use the ToC feature of your word processor), 1.5-2 line spaced text, a short bibliography/list of sources (Tip: use a bibliographic database manager such as the free on-line RefWorks, or similar. I use EndNote.)
  - There are two options for the graduate increment paper: a literature review option and an applied methodology option.
    - For the literature review option, students will screen the professional **literature** for theoretical discussions and empirical findings on mode split (or another topic related to the course and of interest to you), or review an agency report or sections of a text.
    - Alternatively, the graduate increment can be have a **methodological** and applied focus by exploring a TransCad feature not dealt with (or only briefly discussed) in class.
- Suggested date for paper and presentation is April 6.

The final project of graduate students is expected to be more challenging and employ more sophisticated procedures than the projects of undergraduate students.

### Grading:

Grades will be assigned using a +- system as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93.3-100	90-93.3	86.7-90	83.3-86.7	80-83.3	76.7-80	73.3-76.7	70-73.3	66.7-70	63.3-67.7	60-63.3	<60

#### Elements of the grade:

- Labs: approx. 60 points
- Final project drafts: 5 points (idea- 1pt; draft paper/outline – 2 points, draft digital presentation – 2 points)
- Final digital presentation: 6 points
- Final oral presentation: 8 points
- Final project paper: 10 points
- Attendance, participation: 10 points
- Exams/quizzes: TBD
- Bike-ped count: 1 bonus point per count, May 1 and May 5

#### Graduate increment:

- Digital presentation file: 4 points
- Oral presentation: 5 points
- Paper: 11 points

## Assignments:

### No late assignments:

- Given the complexity of the grading system, it would create a considerable burden to keep track of late lab assignments. Therefore, no late assignments. Please submit lab assignments on the due date.
- **You can miss one lab assignment without a negative effect on your grade. However, no late assignments.**
- Should we encounter an unforeseen and systematic technical problem that makes it difficult for the entire class to meet a deadline, a specific due date will be changed for all.
- Please communicate with me immediately if such technical difficulties should occur.

### Submit assignments in Moodle Dropbox:

- Assignment will be submitted via Moodle dropboxes. The typical time for submission is 8 pm the Tuesday following the Wednesday lab (essentially 1 week) or equivalent if labs are assigned on a different day.
- Presentations will be submitted digitally before class of presentation date.
- Papers will be submitted in print and digital form when due.

## Schedule:

At the end of this syllabus is a schedule of topics, including a list of readings and due dates.

- I have invited several guest speakers from the public, and the private sectors.
- As I will build some completely new labs (related to MFBN) into the course, some labs shown to be tentative, depending on the flow of the course.
- (However, we need to reach the Traffic Assignment stage as the final step of the Travel Demand Model.)
- Changes to the schedule may be made, and these changes will be announced in class.

## Degree Requirements:

GPHY 486 Transport, Planning, and GIS relates to Geography degree requirements as follows  
for undergraduate students:

- BA/BS students pursuing a geography degree without option (BA/BS General Geography) can take this course as a Geography elective.
- BA students in the planning option (BA CEP) select GPHY 468/469 *Community and Regional Analysis* **OR** GPHY 486/489 *Transport, Planning, and GIS* (they can also take both)
- Students pursuing the GIS certificate, can use GPHY 486/486 as an elective (Vector GIS & Networks) or/and GPHY 468/468 (Data Management & Collection) to meet the 10-11 elective credit requirement.

for graduate students:

- MA/MS students without option (General Geography): GPHY 486/489 is an elective
- MS student in the planning option (MS CEP) are required to take GPHY 468/469 Community Analysis (GPHY 486/489 is elective)
- MS students in Cart/GIS option (MS Cart/GIS) either take GPHY 491/486w489 Transport Planning **OR** GPHY 468/469 (other may be elective)
- Graduate students who write a thesis involving transportation methods (or network models) can, with the approval of their advisor, take GPHY 486 to meet the methods requirement of the graduate degree. Please note that, in addition to travel demand modeling, GIS-T can be used in the social sciences to solve routing and logistics problems. GIS-T can be used in the natural sciences as well, i.e. for watershed models.

### **Software, Team Work, Planning, etc.:**

- This is a hands-on, project-oriented course which benefits from team work.
- We will have access to 24 server licenses of TransCad (17 in Stone 218 and 7 in Stone 219. It is advisable to access the server licenses in sequence, not all at once.
- TransCad, a GIS-T (Transportation GIS) developed by the Caliper Corporation, is mainly designed for travel demand modeling as well as routing and logistics problems. The retail value is \$10,000 per single commercial license, and \$2000 per educational copy.
- On the Robinson2016 server is a folder containing the TransCad Demo software. It is fully functional but limited to pre-determined (canned) Caliper data. Additionally, it times out (after 60 minutes or so). You can copy that folder to your a memory stick for installation on your own computer.
- Caliper produced several video tutorials for Maptitude, a low-cost GIS with an interface similar to TransCad. <https://www.caliper.com/maptitude/mapping-software-video-tutorials.htm>
- Additionally, keep in mind that TransCad is challenging to novice users. The version currently in use (TransCad 7) includes an 'undo' feature, which was requested by previous users. However, 'undo' places greater demands on a computer system and this may challenge networked computers in lab settings.
- (My experience: It really helps to close files after completing a step and re-opening for the next. If the software crashes, it helps to reboot the computer: shut it down completely and start new. It may be a good habit to do so before each lab session, especially once we start working with Missoula data.)

### **Course Materials and Communication via Moodle or Server:**

#### **Course Materials:**

- In my lectures, I will use PowerPoint presentations. I plan to post the presentations either shortly before class or soon after class on Moodle. Posting on Moodle can be quite slow but I will do my best to give you access to course materials 24/7.
- I will also post this syllabus on *Moodle*.
- For Readings, please check the Server/Moodle.
- Instructions for assignments and geographic files needed will be on the Server. We are on our way to become 'greener' by using less paper and ink/toner. Please let me know in advance if you prefer a paper copy, in addition to the digital copy.

#### **Communication:**

- Besides access to course materials and assignments, Moodle offers easy communication between instructor and students.
- I will post announcements for the class, and also send e-mail. Moodle is set up to send e-mail to your official university e-mail address. If you do not regularly read your university e-mail, you could miss out on information.
- To avoid missing out on communications, I recommend that you develop the habit of using your university e-mail or to forward messages from your university e-mail to the account that you use. IT Central can help if needed.

### **Logistics: The Lab, LOGIN, the Server, File Locations, Printing, etc.:**

#### **Access to the GRT Lab (218 and 219):**

- To access the labs 218 and 219 outside of the class period, please use your Griz Card on the card reader at Stone 219. I will contact our Administrative Associate to activate your Griz Card as a swipe card to access 219. Please let me know if you experience a problem. I will make every effort to keep the door between 218 and 219 open. Please help me with these efforts.

- The door from the hallway to 218 should be closed unless there is an instructor/class in the lab.

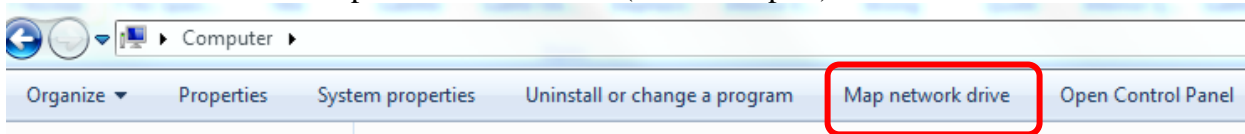
## LOGIN:

To log on to computers,

- you need your NetID and Password. If you have a NetID as a student and as a UM employee, please use the student NetID,
- domain is Missoula.
- If you use other domains, ie CFC, permissions for you to access class materials on the server will likely not work.

## The Server ROBINSON2016

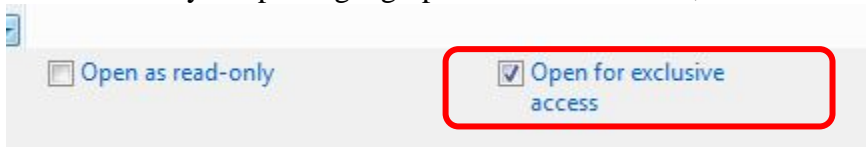
- We will use the server Robinson2016, i.e. to access the Missoula street network data (provided by the Missoula Planners.)
- Using your NetID (with domain Missoula), you can get access to the server by 'mapping' to the server. I recommend to map to network drive T (T for transport). Please use GPHY486.



[\\Robinson2016\\classes\\$](\\Robinson2016\\classes$) or  
[\\Robinson2016\\classes\\$\\GPHY486](\\Robinson2016\\classes$\\GPHY486)

## Files on the Server: Read versus Write Access:

- Materials needed for lab assignments will be in a folder on the server.
- You can access (read) the data, but cannot write (save) to it.
- I created a student folder for each student with write privileges. Copy the lab folders (or the materials from the lab folders) to you own directory so you have write access.
- If you read the data from the 'collective' lab folder, others may be blocked from accessing it.
- When you open a geographic file in TransCad, make sure to '**open for exclusive access.**'



- Please note that TransCad is 'path sensitive.'

## Printing:

- With few exceptions, we will avoid printing.
- You can use UMoney on your GrizCard to print to the printer in Stone 219.
- Note that the printer charges for color if **any** amount of color is used in the document (ie color on a URL or email)!

## Around the Labs:

### Please Be Considerate of Others:

- Cell phones are disruptive to instructors and fellow students. If you carry a cell phone, please turn it off during the class period.
- It is equally disruptive to arrive late or walk into and out of the class room during the class period. Your cooperation is appreciated in keeping these disruptions to a minimum, unless there are health problems or other special circumstances.

- During the lab periods you may set a cell phone to a quiet signal setting, which alerts you to a call without disrupting others. If you wish, you may step out during the lab period to respond to the call. Do not answer calls in the lab, please.
- If you come to Ston 218 during a period when another class is in session, communicate with the instructor (best in advance) whether it is OK to use an available station. Instructors may or may not give that privilege. Under no circumstance chat with others while another instructor's class/lab is in session

#### **On Food and Beverages: No Food in lab 218 and near computers in 219.**

- Please use the Geography lounge for snack breaks between classes.
- Beverages are only allowed in our computer labs if kept in closed containers.
- This is to protect the equipment and to keep both working and eating environments sanitary.

#### **Health Habits:**

- Let us also keep in mind that this is cold and flu season and that we are working in fairly close quarters. An outbreak of cold or flu would negatively impact this course.
- Please wash your hands thoroughly and frequently and use hand sanitizer. Thank you!

#### **Additional Information:**

##### **Academic Honesty/Student Conduct:**

- All students must practice **academic honesty**. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University.
- All students need to be familiar with the **Student Conduct Code**. The Code is available for review online <http://www.umt.edu/vpesa/Dean%20of%20Students/default.php> or <http://www.umt.edu/vpesa/documents/Student%20Conduct%20Code%20PDF-%20FINAL%208-27-13.pdf>

##### **Disability Accommodation:**

- Students requesting disability accommodations are advised to contact the **DSS office** (406-243-2243), Lommasson Center 154.
- Please see <http://www.umt.edu/dss/> or the corresponding pages of the Catalog.
- I will gladly accommodate students with disabilities. However, I need to be notified of that early on. It is not feasible to retro-actively accommodate students.
- I will seek to provide accessible documents as much as feasible.

##### **Incompletes:**

- Please see the Catalog pages for University policies on **Incompletes**. My recommendation: make every effort to avoid an Incomplete! If you have an emergency in the latter part of the semester, please communicate with me to discuss whether an Incomplete is an option for you.

##### **Career Services:**

- The **Office of Career Services** assists students in achieving career objectives. Please see the **Career Services** website for the range of services <http://www.umt.edu/career/>. Note, for instance, the **Big Sky Career Fair** in February <http://www.umt.edu/career/about/career-fairs/big-sky-employment-fair/default.php>.

**Internships:**

- A professional internship can be a useful addition to your formal education.
- Internship experience also adds to your resume.
- Furthermore, an internship can allow you to connect with a potential long-term employer.
- For the UM's [Enrichment-Internship Services](http://www.umt.edu/internships), please consult the website <http://www.umt.edu/internships>.
- Internship opportunities, brought to the attention of current or ex-students or our faculty members, are also publicized via the Geography listserv.
- Previously, students had also good luck in locating and even opening up internship opportunities by directly contacting agencies and employers they would like to work for.
- Professional conduct is critical in assuring success with in arranging for and successfully completing internships.

**Geography Listserv – Social Media:**

- The [Geography listserv](http://hs.umt.edu/geography/resources/list-serv.php) allows you to gain and share information about up-coming departmental events (from group advising to parties); internship, preceptorship, and job opportunities; and other relevant information (graduation deadlines, course announcements, meeting announcements, etc.) The instructions below are from our website: <http://hs.umt.edu/geography/resources/list-serv.php>
- To join:
  - Send an e-mail to: GEOGRAPHY-subscribe-request@LISTS.UMT.EDU
    - This must be sent from the e-mail account that you wish to be on the Listserv
    - 2) Leave the subject line blank
    - 3) In the body of the e-mail type this:
      - subscribe your name Geography
    - You will receive an e-mail message confirming your subscription.
    - If you have any questions, please contact our Administrative Associate
- Please use the listserv judiciously. Keep in mind that the REPLY key will go to ALL listserv members, not only the person who sent a previous message.
- There is also a Geography Facebook page
- The Geography Club also has a Face book page to communicate about GeoClub events.

**Final Exam Schedule**

- The final exam schedule shows Tuesday, May 8 and Wednesday, May 9, 10.10-12.10 as exam periods for Gphy 486 and 489, respectively

**REGULAR FINAL EXAM SCHEDULE**

Hour on which class has met during the semester:	If the class meets daily, 4 times a week, or M, MWR, MWF, MF, MW, MTW, WF, TWF, MR, TW, TWR, WR, W, F or MT, the final exam will be held at this time:	If the class meets TR, T, R, MTR, RF, TRF, R, or TRS, the final exam will be held at this time:	Meeting date for the final exam:
8:00 am	10:10-12:10	8:00-10:00	Monday, May 7
9:00 am	10:10-12:10	8:00-10:00	Tuesday, May 8
10:00 am	10:10-12:10	8:00-10:00	Wednesday, May 9
11:00 am	10:10-12:10	8:00-10:00	Thursday, May 10
12:00 pm	10:10-12:10	8:00-10:00	Friday, May 11
2:00 pm	3:20-5:20	1:10-3:10	Monday, May 7
1:00 pm	3:20-5:20	1:10-3:10	Tuesday, May 8
4:00 pm	3:20-5:20	1:10-3:10	Wednesday, May 9
3:00 pm	3:20-5:20	1:10-3:10	Thursday, May 10

**Schedule and List of Readings**

- Please see below (screen snag)
- An EXCEL file showing the schedule and the readings is distributed in class and also on Moodle.

Date	Loc	room	Topic	Readings (see for modification)	See Dates
22-Jan	Ma	4	Introduction to the course; GIS vs. GIS-T, grid incremental; links-and-edges; incremental intersection	Hansen, S. 2004. Ch 1 The Control of Urban Travel; Parker in Hansen, Ch 4 Aggregate Characteristics of Urban Travel, pp. 85-93; Black 2003 Ch 18 Spatial Trends; Meenakshi 2007 Meeting Millions, Ch 4;	
24-Jan	We	2	Lok 1: Intro to GRTI links; TransCAD basics with TransCAD tutorial and weekly MSLW data; shapely of blackgroup data; proportional symbols/pie maps; Mala street layout;	TCUG Ch 4 Introduction; Caliper [MapInfo] Tutorial notes; <a href="http://www.caliper.com/mapinfo/mapping-software-notes-tutorials.htm">http://www.caliper.com/mapinfo/mapping-software-notes-tutorials.htm</a>	
25-Jan	Fr	3	Transpolution - Hansen; Bands; Streets - Helsinki - Helsinki bands; Thirumala, regional and network partitioning; Facility location modeling	TCUG Ch 13, 14 & 15 Helsinki; TCRL Ch 4 Partitioning/Clustering; TCRL Ch 5 Facility Location Modeling	
25-Jan	Ma	4	online		Lok 4 dari: Tuesday, Jan 28, 8pm
26-Jan	We	5	Lok 2: Feed back data: loading with Lul-luu; Thirumala polygons, buffers, network bands; [distinction/partitioning?], network partitioning, Facility location		
2-Feb	Fr	6	QBR, Shortest path, multiple paths, TSP, network arcs; disabling links, network updates	TCUG Ch 18 Shortest Paths, Ch 19 & 20 Helsinki & Helsinki Solving, Ch 18 Helsinki, Ch 22 Graphical Real-time Tools	
3-Feb	Ma	7	online		Lok 2 dari: Tuesday, Feb 5, 8pm
7-Feb	We	8	Lok 3: SP, multiple paths; routing: traveling salesman problem; vehicle routing	TCRL Vehicle Routing;	
3-Feb	Fr	5	private notes: Jordan Hsu, Director of ASUM Transport	[supplemental] - PM: TCUG Ch 7 Linear Regression	
12-Feb	Ma	18	Basics of Transport and GIS forms; GIS vs. GIS-T	Miller-Skew, 2011, Ch 3. GIS-T Data Models; Ch 4. Data Modeling and Database Design; plus day readings - online	Lok 3 dari: Tuesday, Feb 15, 8pm
14-Feb	We	11	Lok 4: Parado - SP, routing - disabling links, updating network; localization; alternative TPO	Solution arcs, Network routing	
15-Feb	Fr	12	Control of Urban Travel	[See above: Hansen, Parker in Hansen, Black, Meenakshi] HCHRP 365 & 746; Mala TDME	
15-Feb	Ma	18	Private notes: Day, online		Lok 4 dari: Tuesday, Feb 28, 8pm
21-Feb	We	13	Lok 5 Control network (Machellon down) - localization; alternative TPO, in Mala Streets	Editing geographic files	
23-Feb	Fr	14	public notes: Dan Grap/Ryan Wilson, Minnesota Transport Planning; UMCUR akurata dari 20 Feb 23, UMCUR meeting on April 27	Minnesota Long Range Transportation Plan <a href="http://www.ci.minneapolis.mn.us/DocumentCenter/View/33174">http://www.ci.minneapolis.mn.us/DocumentCenter/View/33174</a> ; Transport Handbook-MP-0a	
26-Feb	Ma	15	Crane Geographic Terms and Concepts [localization form]	<a href="http://www.crane.com/geographic-terms/gdf/GTC_18.pdf">http://www.crane.com/geographic-terms/gdf/GTC_18.pdf</a>	Lok 5 dari: Tuesday, Feb 27, 8pm
28-Feb	We	16	Lok 6 Mala Street-Geographic Data; Mapit poster akurata dari 20 Marak 5, meeting April 15-28 in Hla		
2-Mar	Fr	17	public notes: Dan Wilson and Katherine Rapp, Mala Dike-Pd/HH	Kagla-Rp-Marginalization of bikes; Mala Dike Facility Master Plan <a href="http://www.ci.minneapolis.mn.us/DocumentCenter/View/33174">http://www.ci.minneapolis.mn.us/DocumentCenter/View/33174</a>	
5-Mar	Ma	18	TDM Intro, Trip production and allocation	Crane Geographic Terms and Concepts [localization form]; HCHRP 365 Ch 3: Trip Generation-Allocation; HCHRP 365 Ch 3: Trip Generation, pp. 28-35; HCHRP 746 - appropriate pages; Mala TDME - appropriate	Lok 6 dari: Tuesday, March 5, 8pm
7-Mar	We	13	Lok 7 Trip production Lok		
9-Mar	Fr	28	Employment Data, Trip Allocation, Spatial Models, ITE Trip Rates		
12-Mar	Ma	21	Trip Allocation, spatial model online		Lok 7 dari: Tuesday, March 13, 8pm
14-Mar	We	22	Lok 8a Trip Allocation; Lok 8b Spatial Generation, External Stations		
16-Mar	Fr	23	private notes: Curry Hledger and Bill Pfeiffer, Minnesota Linc	TCTDM Ch 7 Mode Split; <a href="http://www.minnstatelinc.com/news-alerts/news-alert">http://www.minnstatelinc.com/news-alerts/news-alert</a>	
18-Mar	Ma	24	Allocation, Trip Distribution	Chapters on Trip Distribution from TCTDM Ch 6; HCHRP 365 Ch 4. Trip Distribution, pp. 35-47; HCHRP 746 - appropriate pages; Mala TDME-appropriate pages	Lok 8a, b dari: Tuesday, March 28, 8pm
21-Mar	We	25	Lok 9a Allocation		
23-Mar	Fr	26	Lok 9b Trip Distribution [9-25: Akurata dari GradCon dari konferensi on 4-28]		
March 26-28	March		Spring Break, no classes		
27-Mar	Ma	27	Mode split; Trip production?	TCTDM Ch 7 Mode Split, etc. Trip production	Lok 3 dari: Tuesday, April 3, 8pm
4-Apr	We	28	Lok 10: TPO, trip production? Or survey of UM Faculty & students		
6-Apr	Fr	23	Grad incremental generalization and paper		Grad incremental digital generalization and digital paper dari: Friday April 6, or before 8.30 am; paper maps in class
9-Apr	Ma	38	PA to OD, Time of Day Analysis, Vehicle Occupancy	HCHRP Report 365: Ch 8 Time-of-Day Characteristics, pp. 84-92; Ch 7 Automobile Occupancy Characteristics, pp. 76-88; TCTDM Ch 8 P-A to O-D and Time of Day Transformations, etc.	Lok 10 Tuesday, April 18, 8pm
11-Apr	We	31	Lok 11, PA, OD, TAD, Van		
13-Apr	Fr	32	Traffic Assignment	HCHRP Report 365: Ch 3 Traffic Assignment Procedures, pp. 33-183; TCTDM Ch 3 Traffic Assignment; etc.	
15-Apr	Ma	33	Lok 12: Traffic Assignment		Lok 11 dari: Tuesday, April 17, 8pm
18-Apr	We	34	Lok 12: Traffic Assignment - online		
20-Apr	Fr	35	MAGIP Conference, Helsinki; also UM GradCon [localization: no class]		
23-Apr	Ma	36	Review of TDM, QBR; final project ideas		Lok 12 dari: Tuesday, April 24, 8pm
25-Apr	We	37	Lok 13 - work on final project [project ideas dari]		Final project ideas dari [line - online] Wednesday, April 25, 8pm
27-Apr	Fr	38	private notes: Tom Drigham, HDR; also UMCUR	<a href="http://www.hdr.com">www.hdr.com</a> ; <a href="http://www.metr.net/articles-43624.html">http://www.metr.net/articles-43624.html</a>	
30-Apr	Ma	39	work on final		
2-May	We	40	work on final; final project draft dari		Final project draft dari [paper online]; ppl draft Wednesday, May 2, 8
4-May	Fr	41	work on final		
May 7-11	May	42	Tuesday, May 8, 10-12-18; Wednesday, May 9, 10-12-14		digital/ppl generalization and digital paper dari or before 3.30 am; paper hardcopy at final
12-May	Ma	43	Commencement		